

# THE ARBOREAL FROGHOPPER *APHROPHORA SALICINA* (GOEZE) (HEMIPTERA: APHROPHORIDAE) ON CREEPING WILLOW AT DUNGENESS

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## ABSTRACT

The abundance of the froghopper *Aphrophora salicina* (Goeze) on grey willow *Salix cinerea* at Dungeness, Kent is reported. Mean numbers of nymphal spittle masses ranged from 13.8–24.7 per 50 branchlets over the period 2000–2006. Much lower numbers of spittles were found on creeping willow *S. repens*, a previously unreported hostplant for *A. salicina* in UK. Possible reasons for the differences between the two *Salix* species are discussed. A brief botanical survey revealed there were very few plants of *S. repens* at Dungeness, and as a result, a more detailed census of this species is recommended.

## INTRODUCTION

The willow froghopper *Aphrophora salicina* (Goeze) (Hemiptera: Aphrophoridae) is widely distributed in Kent, though it tends to occur locally in higher numbers in wooded areas in the south of the county. It occurs in low numbers on the Isle of Sheppey, where it appears to be associated equally with cultivated and native trees. For a homopteran, the adult insect is relatively large and conspicuous, with adult males ranging in body size from 8.7–10.2 mm and females 9.0–10.8 mm. *Aphrophora salicina* is thus approximately twice the size of the common meadow spittlebug *Philaenus spumarius* (L.), whose nymphs produce ‘cuckoo spit’, a familiar sight in early summer.

*Aphrophora salicina* nymphs and adults feed primarily on grey willow, *Salix cinerea* L., the commonest species of willow in southern, lowland Britain. The willow exists in two forms, ssp. *oleifolia* Macreight, formerly referred to as *S. atrocineera* (Brot.), and ssp. *cinerea* L. In Kent, ssp. *oleifolia* (*S. atrocineera*) is extremely common (666/1044 tetrads), whereas ssp. *cinerea* is local and restricted to very wet marshes and fens (20/1044 tetrads) (Philp, 1982). The froghopper feeds on both subspecies and occurs in high numbers in wooded, shrubby areas such as at Bough Beech Reservoir, Ham Street Woods and Dungeness. It also occurs in man-made habitats. A very heavy infestation of this species was observed this year on various *Salix* cultivars planted as hedging around the roundabout at junction 10 of the M20, east of Ashford (TR038415).

*Aphrophora salicina* is particularly common on stands of grey willow scrub growing by the Long Pits at Denge Beach, Dungeness. During a long-term study of the froghopper at this locality it became apparent that *A. salicina* occasionally occurs on creeping willow *Salix repens* L. (*S. arenaria* L.), a very local plant in Kent (Philp, 1982). This note brings together some casual observations on this host plant association.

## METHODS

The study site was located south of the Dungeness Road/Kerton Road junction (TR082187), near Lydd-on-Sea, Kent.

Nymphs of *A. salicina*, feed communally, in groups of up to 20 individuals in spittle masses on *Salix* stems. Estimates of population size of *A. salicina* were obtained by recording the number of individual spittle masses per 50 branchlets (4–10 cm growth extensions) on 10 bushes during the first week of June, each year. Up to two counts were made of 50 branchlets on *S. repens* growing in the same patch of willows for comparison.

## RESULTS

Estimates of the mean number of nymphal spittle masses of *A. salicina* on the two *Salix* species for the period 2000–2006 are shown in Table 1. Peak numbers of *A. salicina* occurred in 2000 and 2001, and again in 2004 and 2005. Appreciably lower numbers were recorded in 2003 and in 2006, with numbers 38% below the peak of the previous year.

Table 1 Mean number of nymphal spittle masses of *Aphrophora salicina* at Dungeness, 2000–2006

		Mean no. of spittle masses per 50 branchlets						
	n	2000	2001	2002	2003	2004	2005	2006
<i>S. cinerea</i>	10	23.9	24.7	–	17.8	20.8	22.1	13.8
<i>S. repens</i>	1–2	–	13	–	0	4.0	2.0	2.0

The frequency of spittle masses of *A. salicina* on *S. repens* was generally one tenth of that found on *S. cinerea*. Much higher numbers were recorded on *S. repens* in 2001 when numbers were at their highest on *S. cinerea*. No spittle masses were found in 2006 when numbers were low on the main host plant.

Spittle masses also varied considerably in size. Those on *S. repens* were relatively small (1.0–1.8 cm) and contained on average 1–3 nymphs (Plate 2, Fig. 4), whereas those on *S. cinerea* were 2.0–6.5 (8) cm long and contained 2–8 nymphs (Plate 2, Fig. 5). Total numbers therefore tended to be approximately 20× higher on *S. cinerea* than on *S. repens*.

## DISCUSSION

The results show that *A. salicina* prefers to feed on grey willow. The nymphal densities observed at Dungeness were unusually high (13.8–24.7 spittles per 50 branchlets), with average infestations elsewhere in Kent ranging from 1–5 spittles per 50 branchlets. The exact reason for the relatively high numbers is unknown but may be related to the exposed, isolated, rather atypical scrub found at Dungeness, where normal woodland predators may not occur. The nearest areas of extensive, dense woodland are to be found along the former coastline at Ham Street and Kenardington, 15–18 km away. Whatever the reason, there is increasing evidence at Dungeness that heavily-infested trees, can remain heavily-infested for a period of 10 years or more, whereas other similarly-aged trees nearby continually support low numbers of froghoppers (J. Badmin, pers. observ.).

The results are not an ideal data-set to work with simply because they relate to chance observations. It is tempting to speculate that the froghopper chooses to lay its eggs on *S. repens* when densities on its main food plant are high and oviposition sites

are relatively scarce. There is some evidence to support this, but considerably more data are required to confirm this hypothesis. In years when there are large numbers of adults, there is a greater probability of individuals finding *S. repens* by chance. *Aphrophora salicina* prefers to lay its eggs 1.0–1.5 m above ground level, based on the position of spittle masses, which is higher than most *S. repens* plants grow at Dungeness. The lower densities found on *S. repens* may therefore be due simply to a matter of height and not to perceived differences in host plant preference.

Although there are no references to *A. salicina* nymphs feeding on *S. repens* in the UK, Nickel (2003) cites this species as a hostplant in his table of Auchenorrhyncha utilizing Salicaceae in Germany, though he does not state specifically that this refers to nymphal feeding. The occurrence of this species on *S. repens* is more likely in the west and north of England where the plant is more prevalent (Preston *et al.*, 2002). Creeping willow in Kent is restricted to Dungeness and the coastal area around Sandwich. The distribution map illustrated in the current county flora (Philp, 1982) can give the impression that *S. repens* is widespread and common at Dungeness (4 tetrads), but the plant is apparently extremely rare. During a recent visit this autumn, only nine mature plants, well separated from each other, were found in the shingle to the east of the Long Pits. *Salix repens* is dioecious and it was not possible to determine whether both sexes were present. Stace (1991) states that *Salix* species are usually represented by both sexes in roughly equal numbers and that bisexual catkins are not rare, particularly in hybrids. In view of the relatively low number of individual plants found, it is possible that stochastic events could result in the sex ratio shifting markedly from 1:1 and thus restricting the possibility of fertilization and regular seed production. Pollination in *Salix* is reported to be mainly entomophilous (Meikle, 1984).

All of the plants observed were relatively mature; no seedling plants were discovered. The willow is obviously able to increase in size by rhizomatous growth and several of the larger bushes, 2–2.5 m in diameter, were in good condition with a mass of new stems sprouting around the edges. However several other bushes showed signs of die-back. The willow has long been known to occur at Dungeness (Hanbury & Marshall, 1899) and was first recorded there by Parkinson (1640) as *Salix pumila latifolia*. There are no published reports describing the abundance of *S. repens* at Dungeness so it is difficult to determine whether the plant has always been rare or that numbers are declining. The results of the recent national survey show that *S. repens* has declined (–0.42), especially in southern England (Preston *et al.*, 2002). A detailed survey of the status of this willow at Dungeness would appear desirable.

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